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EXAMINER	
FUJITA, KATRINA R	
ART UNIT	**PAPER NUMBER**
2609	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/28/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/776,736	DEWAELE, PIET	
	Examiner	Art Unit	
	Katrina Fujita	2609	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-14 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 10 February 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 02/10/2004.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

2. The disclosure is objected to because of the following informalities:

On page 2, line 9, "breasts" should be --breasts'--. This appears to be a typographical error.

On page 2, line 29, "image" should be --image--. This appears to be a typographic error.

On page 3, line 25, "consist in" should be --consists in--. This appears to be a typographic error.

On page 3, line 27, "needs be" should be --needs to be--. This appears to be a typographic error.

On page 4, line 14, "up-right" should be --upright--. This appears to be a typographic error.

On page 4, line 25, "2 D" should be --2 D--. This appears to be a typographic error.

On page 5, line 6, "P0" should be --P_0--. This appears to be a typographic error.

On page 5, line 24, "fig. 1" should be --Fig. 1--. This appears to be a typographic error. Corresponding changes should be made to the references to all figure numbers (i.e. "fig. 2").

On page 6, line 26 and page 7, line 4, "edge based" should be --edge-based--. This appears to be a typographic error.

On page 14, line 31, "fourier" should be --Fourier--. This appears to be a typographic error.

On page 16, line 1, "fig. 6" should be "Fig. 6a". This appears to be a typographic error.

On page 17, line 5, "chords'" should be --chord's--. This appears to be a typographic error.

On page 19, line 16, it appears that "fig. xxx" should be "Fig. 5". Further clarification is required.

On page 22, line 12, "fig. 6" should be "Fig. 6a". This appears to be a typographic error.

On page 23, line 9, "fitted" should be --fit--. This appears to be a typographic error.

Appropriate correction is required.

Claim Suggestions

3. In claim 6, at line 1, "comprising" should be replaced with --further comprising--.

Claim Objections - 37 CFR 1.75(a)

4. The following is a quotation of 37 CFR 1.75(a):

> The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.

5. Claims 1, 4, 5, 7, 9, 10 and 14 are objected to under 37 CFR 1.75(a), as failing to particularly point out and distinctly claim the subject matter which application regards as his invention or discovery.

Claim 1 lacks antecedent basis for "the digital representation" at line 2. The following will be assumed for examination purposes: "~~the~~ a digital representation".

Claim 4 lacks antecedent basis for "the curvature" at line 2. The following will be assumed for examination purposes: "~~the~~ a curvature".

Claim 5 lacks antecedent basis for "said curvature" at line 2. The following will be assumed for examination purposes: "~~said~~ a curvature".

Claim 7 lacks antecedent basis for "said digital signal representation" at line 2. The following will be assumed for examination purposes: "said digital ~~signal~~ representation".

Claim 9 recites "said orientation" in line 6. It is unclear whether this is intended to be the same as or different from the "orientation" recited in line 2 or the "orientation" recited in line 3. The following will be assumed for examination purposes: "said derived orientation".

Claim 10 recites "said orientation" in line 6. It is unclear whether this is intended to be the same as or different from the "orientation" recited in line 2 or the "orientation" recited in line 3. The following will be assumed for examination purposes: "said derived orientation".

Claim 14 currently depends from claim 1, and as such, is a duplicate of claim 13. It appears that this is a typographical error and should depend from claim 2. Therefore, it will be assumed that claim 14 depends from claim 2 for examination purposes.

Claim Rejections - 35 USC § 101

6. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows:

> Claims that recite nothing but the physical characteristics of a form of energy, such as a frequency, voltage, or the strength of a magnetic field, define energy or magnetism, per se, and as such are nonstatutory natural phenomena. O'Reilly, 56 U.S. (15 How.) at 112-14. Moreover, it does not appear that a claim reciting a signal encoded with functional descriptive material falls within any of the categories of patentable subject matter set forth in Sec. 101.
>
> ... a signal does not fall within one of the four statutory classes of Sec. 101.
>
> ... signal claims are ineligible for patent protection because they do not fall within any of the four statutory classes of Sec. 101.

7. Claims 11 and 12 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows.

Claims 11 and 12 define a signal with descriptive material. While "functional descriptive material" may be claimed as a statutory product (i.e., a "manufacture") when embodied on a tangible computer readable medium, a signal embodying that same functional descriptive material is neither a process nor a product (i.e., a tangible "thing") and therefore does not fall within one of the four statutory classes of § 101. Rather, "signal" is a form of energy, in the absence of any physical structure or tangible material.

8. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows:

> Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.
>
> When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare In re Lowry, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and Warmerdam, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with Warmerdam, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory).
>
> In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See Lowry, 32 F.3d at 1583-84, 32 USPQ2d at 1035.

9. Claims 11 and 12 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows.

Claims 11 and 12 define a program of instructions embodying functional descriptive material. However, the claims do not define a computer-readable medium or memory and is thus non-statutory for that reason (i.e., "When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized" – Guidelines Annex IV). That is, the scope of the presently claimed program of instructions can range from paper on which the program is written, to a program simply contemplated and memorized by a person. The examiner suggests amending the claims to embody the program on "computer-readable medium" or equivalent in order to make the claims statutory. Any amendment to the claims should be commensurate with its corresponding disclosure.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

11. Claims 1, 3, 8, 9, 11, and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Chang et al. ("Radiology Image Orientation...", SPIE Conference on Image Display, which incorporates Glicksman et al. ("Architecture of a High Performance PACS...", Proceedings SPIE)).

Regarding **claims 1 and 11**, Chang teaches a method to be employed by a computer of determining the orientation of an image ("radiology image orientation processor for workstation display" at section 1, line 3; "image orientation processor is meant to evolve into operational software" at section 2, paragraph 7, line 1) characterized in that the orientation is deduced from a digital representation of the image ("image orientation of digital X-ray images" at section 1, line 4).

Regarding **claim 3**, Chang teaches a method wherein the digital representation is an edge representation ("digital chest image is first read in by the algorithm and then segmented into a binary image" at section 3A, paragraph 1, line 1).

Regarding **claim 8**, Chang teaches a method wherein direct exposure areas are excluded from the digital representation ("pixels in lungs as well as the area outside the body are assigned to be 0" at section 3A, paragraph 3, line 7).

Regarding **claim 9**, Chang teaches a method wherein an image is subjected to an orientation modifying geometric transformation ("If the side image is rotated by 90° or -90°, the algorithm will rotate the image" at page 292, paragraph 6, line 1) to yield a desired orientation of the image ("the algorithm assigns the image with notations such as HA, HP, FA or FP" at page 292, paragraph 6, line 2; "the notation used by the algorithm to indicate the patient's orientation" at section 2, paragraph 5, line 2).

Regarding **claim 13**, Glicksman teaches a computer readable carrier medium ("image processing card provides up to 65 MBytes of high speed buffer storage" at section 4, paragraph 4, line 3).

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. Claim 2, 6, 10, 12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Chang et al. and Kawata et al. ("Characteristics Measurement for...", Nuclear Science Symposium, which incorporates Sander et al. by reference ("Inferring Surface Trace...", IEEE Transaction)).

Chang teaches the elements of claim 1, a computer program product and a computer readable carrier medium as shown in the 102 rejections above.

Regarding **claims 2, 12 and 14**, Chang does not teach calculating curvature and basing a decision on the orientation of the image is based on the calculated curvature.

Kawata discloses a method in the same field of endeavor of medical image analysis ("system for three-dimensional image analysis of blood vessels" at section I, paragraph 2, line 1) wherein curvature is calculated ("surfaces representation using curvatures" at section I, paragraph 3, line 4) and a decision on the orientation of said image is obtained based on the value of the calculated curvature ("following functions are implemented...extraction of the orientation of blood vessels" at section I, paragraph 2, line 5; "functions are based on...surfaces representation using curvatures" at section I, 1, paragraph 3, line 4).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the orientation processor of Chang using the curvature calculation taught by Kawata as described above, to "derive the image understanding of 3D object" (Kawata at section II, paragraph 1, line 13).

Regarding **claim 6**, Chang teaches the elements of claim 1 as shown in the 102 rejection above.

Chang does not teach computing first and second derivative vectors, quantizing the direction and magnitude of computed first and second derivative vectors, weighted voting of quantized first and second derivative directions into analyzing coordinate

system orientations so as to determine a maximum vote and selecting the orientation having the maximal vote.

Sander teaches a method comprising:

computing first and second derivative vectors ("model normal" on page 839, denoted as "N(p,q)"; "a", "b", and "c" in the sentence immediately following equation 1),

quantizing the direction and magnitude of computed first and second derivative vectors (equations 2 and 3 on page 839; "||N(p,q)||" on page 840),

weighted voting of quantized first and second derivative directions ("principal curvatures can be computed at all k points" at section VI-D, paragraph 3, page 843) into analyzing coordinate system orientations ("conversion of the principal directions from the (P,Q) system into R^3 image coordinates" at section V-C, paragraph 3, page 841) so as to determine a maximum vote ("determines the principal direction corresponding to the maximal principal curvature" at section VI-D, paragraph 6, page 844).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the orientation processor of Chang using the Darboux frame estimation taught by Kawata as described above, to "derive the image understanding of 3D object" (Kawata at section II, paragraph 1, line 13).

Regarding **claim 10**, Chang teaches a method wherein an image is subjected to an orientation modifying geometric transformation to yield a desired orientation of the image as shown in the 102 rejection of claim 9.

14. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Chang and Kawata as applied to claim 2 above, and further in view of Uppaluri (US 2003/0215119).

Chang and Kawata teach the elements of claim 2 as shown in the 103 rejection above. Chang and Kawata also disclose that the image is a thoracic image ("chest images" at section 1, line 4).

The Chang and Kawata combination does not teach curvature being determined of ribs or the ribcage.

Uppaluri discloses a method in the same field of endeavor of medical image analysis ("method and system for computer aided detection and diagnosis of dual energy ("DE") or multiple energy images" at paragraph 0001, line 3) wherein curvature is calculated ("region of interest statistics such as shape, size, density, curvature can be computed" at paragraph 0034, line 8; figure 6, numeral 230) which is used in a CAD algorithm ("candidate regions are then classified based on features extracted from the corresponding complete image set" at paragraph 0042, line 7; figure 11, numeral 340) on areas that include the ribs ("edges outside the ribs" at paragraph 0046, line 9).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the orientation processor of Chang and Kawata using the feature extraction taught by Uppaluri as described above, "to separate the edges inside the ribs from the edges outside the ribs, as edges inside the ribs are candidates for fractures" (Uppaluri at paragraph 0046, line 8) and subsequently provide for incorrect image orientation.

15. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Chang and Kawata as applied to claim 2 above, and further in view of Abdel-Mottaleb (US 5,572,565).

Chang and Kawata teach the elements of claim 2 as shown in the 103 rejection above.

The Chang and Kawata combination does not teach a mammographic image and curvature is calculated for skin border edge segments of the image.

Abdel-Mottaleb discloses a method in the same field of endeavor of medical image analysis ("method of and system for segmenting digital mammograms" at col. 3, line 56) wherein curvature is calculated for skin border edge segments ("segment of the skinline of greatest curvature is selected" at col. 4, line 36) of a mammographic image ("digital mammograms" at col. 3, line 57) to detect the nipple in the image ("detected reference point corresponding to the nipple" at col. 7, line 45).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the orientation processor of Chang and Kawata using the skinline extraction taught by Abdel-Mottaleb as described above, to "assure that equal amounts of tissue, between skinline and chest wall, are visualized in all views taken" (Abdel-Mottaleb at col. 2, line 58).

16. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Chang and Pietka ("Image Standardization in PACS", Handbook of Medical Imaging).

Chang teaches the elements of claim 1 as shown in the 102 rejection above.

Chang does not teach excluding collimation areas from the digital representation of the image.

Pietka discloses a method in the same field of endeavor of medical image enhancement ("image content adjustment to make images more readable...in preparation for medical diagnosis" at section 1, paragraph 2, line 6) wherein collimation areas are excluded from an image ("removal of collimator-caused background" at section 2, paragraph 2, line 3).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the orientation processor of Chang using the background removal taught by Pietka as described above, to provide "lossless data compression" (Pietka at section 2.1, paragraph 5, line 3).

Double Patenting

17. Claims 1, 7, 8, 9, 11 and 13 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 10, 11, 13, 14, and 15 of copending Application No. 10/774943.

The conflicting claims are not identical because the copending application requires the additional steps of calculating at least one mathematical moment and basis the orientation decision on the calculated moment(s), not required by claim 1. However, the conflicting claims are not patentably distinct from each other because:

Claim 1 of 10/776736 (hereinafter referred to as '776) and claim 1 of 10/774943 (hereinafter referred to as '774) recite common subject matter;

Whereby claim 1 of '776, which recites the open ended transitional phrase "characterised", does not preclude the additional elements of calculating at least one mathematical moment and basis the orientation decision on the calculated moment(s) recited by claim 1 of '774.

Accordingly, claims 7, 8, 9, 11, and 13 of '776, which depend from claim 1, are thereby anticipated by claims 10, 11, 13, 14 and 15 of '774 respectively.

Whereby the elements of claims 1, 7, 8, 9, 11 and 13 of '776 are fully anticipated by copending application claim 1, 10, 11, 13, 14, and 15 of '774, and anticipation is "the ultimate or epitome of obviousness" (In re Kalm, 154 USPQ 10 (CCPA 1967), also In re Dailey, 178 USPQ 293 (CCPA 1973) and In re Pearson, 181 USPQ 641 (CCPA 1974)).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Conclusion

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 5,579,360, US 6,055,326, US 6,246,784, US 2003/0215120, and 2002/0164060 are each pertinent as teaching medical imaging enhancement systems.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katrina Fujita whose telephone number is (571) 270-1574. The examiner can normally be reached on M-Th 8-5:30pm, F 8-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian P. Werner can be reached on (571) 272-7401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KF

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BRIAN WERNER
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